

## ION SEPARATION AND REMOVAL UNIT WITH GAS EXTRACTION

### **What is claimed is:**

1. An apparatus for de-ionizing fluid solutions of electrolytes and ionized dissolved solids by separation using magneto-hydrodynamic properties and the removal  
5 of ions by discharge with gas extraction, said apparatus comprising:
  - (a) a convoluted conduit having open ends;
  - (b) a first inlet extending into the center of the convoluted conduit;
  - (c) a first continuous wall winding around the center of the convoluted conduit, so that sections of the wall are parallel to adjacent sections of the wall;
  - 10 (d) electro- or permanent magnets wherein activating magnetic fields on both sides of the continuous wall by magnetic North and South polarity extending in the same direction throughout the whole conduit, thereby affecting the flow stream of the ionized solution when passing through the conduit by forcing positive and negative ions to move continuously in opposite directions to each other in a direction lateral and perpendicular to the fluid flow and the magnetic  
15 field and out through the open ends of the conduit,
  - (e) ion collection chambers disposed on laterally opposed sides outside of the conduit whereby ions separated by positive or negative charge within the conduit are concentrated in one or the other of the chambers depending on their charge;
  - 20 (f) electrodes disposed inside of said ion collection chambers, which upon producing a short-circuit closes an electric circuit, whereby internal build-up of electric charge caused by the concentrated ions is released, thereby inducing usable current and discharging and removing ions and generating gases as important by-products; and

(g) effluents providing for a controlled speed outflow from both ion collection chambers into drainpipes.

2. The apparatus for de-ionization as in claim 1 wherein permanent magnets are used in the continuous magnetic wall and where the apparatus has no need of an external power input, when the solution is pumped through the conduit.

3. The apparatus for de-ionization as in claim 1 wherein an outlet of the conduit is divided into cells to control and adjust the de-ionized solution to produce predetermined ion concentrations.

4. The apparatus for de-ionization as in claim 1 wherein a power source to increase the discharge of ions and the de-ionization rate is connected in series with the existing electric circuit thereby increasing the speed at the ions flow through the conduit to the end chambers for discharge and removal.

5. The apparatus for de-ionization as in claim 1 wherein the conduit is in the shape of a spiral.

6. The apparatus for de-ionization as in claim 1 wherein the fluid solutions of electrolytes and ionized dissolved solids further comprise sea water and the apparatus provides desalination to produce hydrogen and chlorine gases in each of the respective chambers.